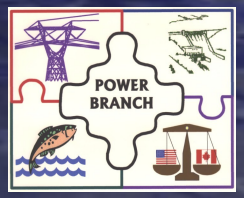
Ms. Lintle Matami Maliehe, Director
Lesotho Lowlands Water Supply Project

HYDROPOWER OVERVIEW

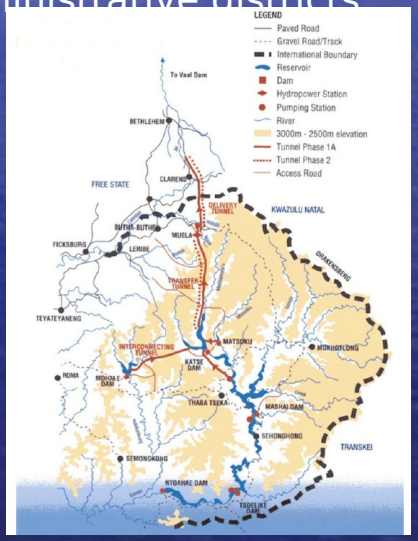
Corps Hydro Program
Columbia River System Operation
HAC and HDC Centers of Expertise

11 July 2005



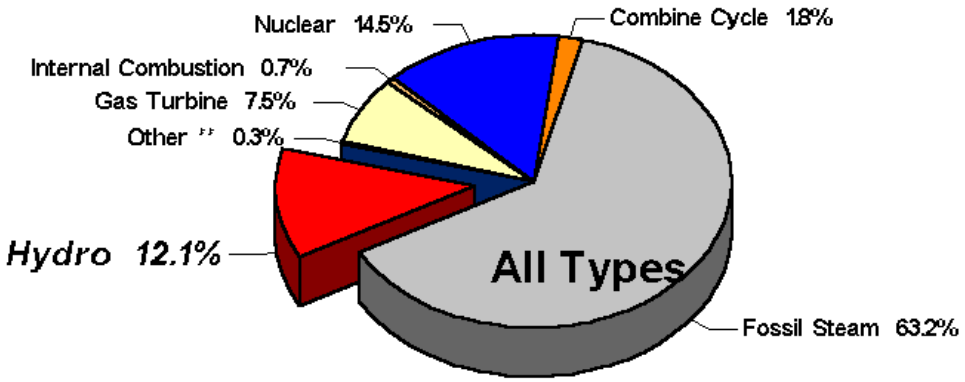
KINGDOM OF LESOTHO

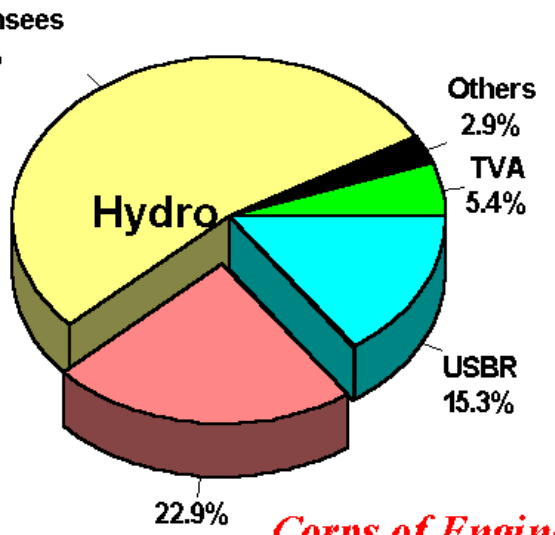
Lesotho , officially Kingdom of Lesotho, kingdom (1995 est. pop. 1,993,000), 11,720 sq mi (30,355 sq km), S Africa. It is an enclave within the Republic of South Africa. Maseru is the capital and largest city. There are ten administrative districts.



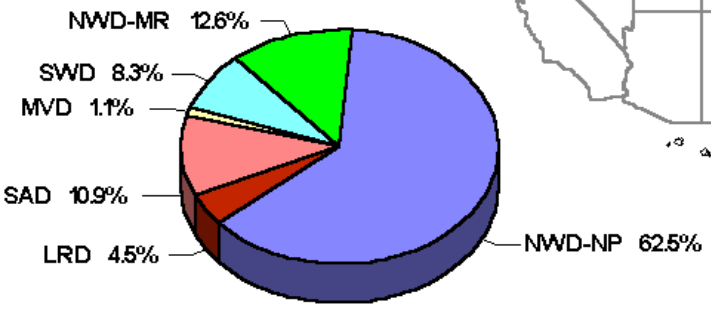
Columbia River:
A= 258,500 sq. mi
L= 1,214 mi.
V= 198 MaF at mouth;
134 Maf at The Dalles
Q= 275,000 cfs /yr & mouth
Fed. Dams: 29 (+2 Rogue)
MW inst.=22,500 MW

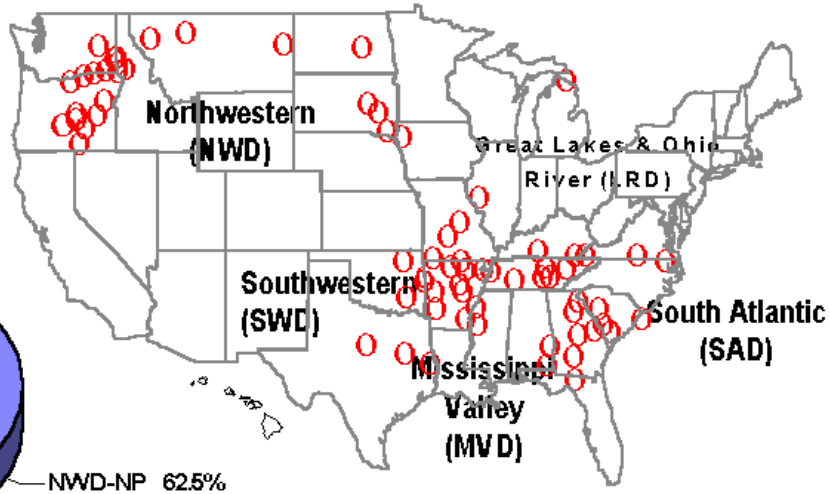
US Generation Capacities and Corps Projects





Corps of Engineers





River Basins of the Pacific Northwest

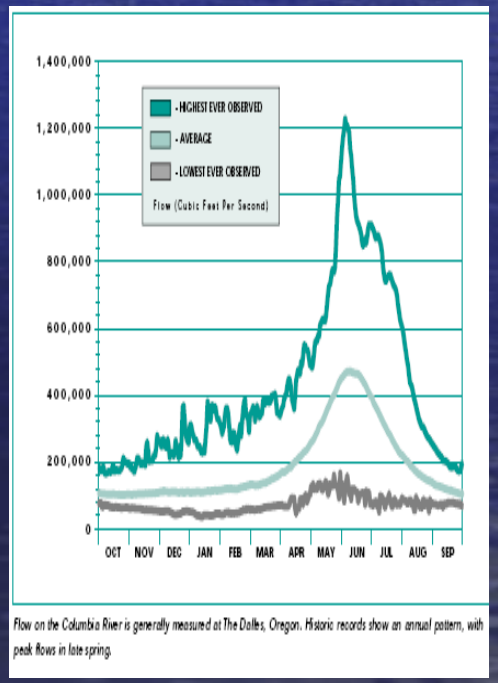
A=669,000 km^2 (102,300 in Canada) – 258,500 mi^2

L= 1,954 km (1,214 mi.)

V= 244 km^3 ave./yr (198 MaF) at mouth

Q=7,787 cu.sec (275,000 cfs) average /yr & mouth

The Dalles: ann. Runoff=134 MaF; 188,900 cfs)



Flow on the Columbia River is generally measured at The Dalles, Oregon. Historic records show an annual pattern, with peak flows in late spring.

USES OF COLUMBIA RIVER SYSTEM

1. FLOOD CONTROL
2. FISH MIGRATION (FISH LADDERS)
3. FISH & WILDLIFE HABITAT
4. HYDROPOWER GENERATION (22,500 MW INST. CAP. IN ‘98)
5. NAVIGATION (465 MI. INLAND; LOCKS)
6. IRRIGATION (6% OF AREA)
7. RECREATION
8. WATER SUPPLY & QUALITY
9. CULTURAL RESOURCES

HYDROPOWER

- NWD HAS LION SHARE (75%) OF COE HYDRO
- PACIFIC NW'S DOMINANT POWER SOURCE
- HIGH FLOW IN SPRING; LOW POWER DEMAND
- SPRING/SUMMER SPILL REDUCES GENERATION
- FISH NEEDS SHORTEN MAINTENANCE WINDOW
- SYSTEM OPERATED PER TREATY AND PNCA
- CORPS GENERATES; BPA SELLS
- CONSTRAINTS: ENVIRONMENT, BPA FUNDING
- SAME MISSION; NEW CHALLENGES; NEED TO BE PRO-ACTIVE

COLUMBIA RIVER TREATY

- PRIMARY FOCUS: POWER, FLOOD CONTROL
- CORPS IS ONE HALF OF THE US ENTITY
  - ✓ CORPS RESPONSIBLE FOR FLOOD CONTROL
  - ✓ BPA RESPONSIBLE FOR POWER
  - ✓ BC HYDRO REPRESENTS CANADIAN ENTITY

- BI-MONTHLY OPERATING COMMITTEE MEETINGS
- WEEKLY OPERATIONAL CONFERENCE CALLS
- CANADIAN ENTITLEMENTS = 0.5 x D/S MW BENEFITS

PACIFIC NW COORDINATION AGREEMENT

Operate as a single entity in a diverse system

- West of Cascades: Qp is with early Heavy Rainfall
  East of Cascades: Qp is with late snowmelt; sparse rainfall
- West has most people; East has biggest dams
  Sophisticate transmission network
- Erratic runoff from season-to-season, and year-to-year
- Needs autonomy, and reasonable flexibility
- Overarching agreement on
  - Rights

TWO HYDROPOWER CENTERS OF EXPERTISE:

- Hydropower Analysis Center (HAC):

  hydropower and water resource planning and analysis

  (originally established in 1949)

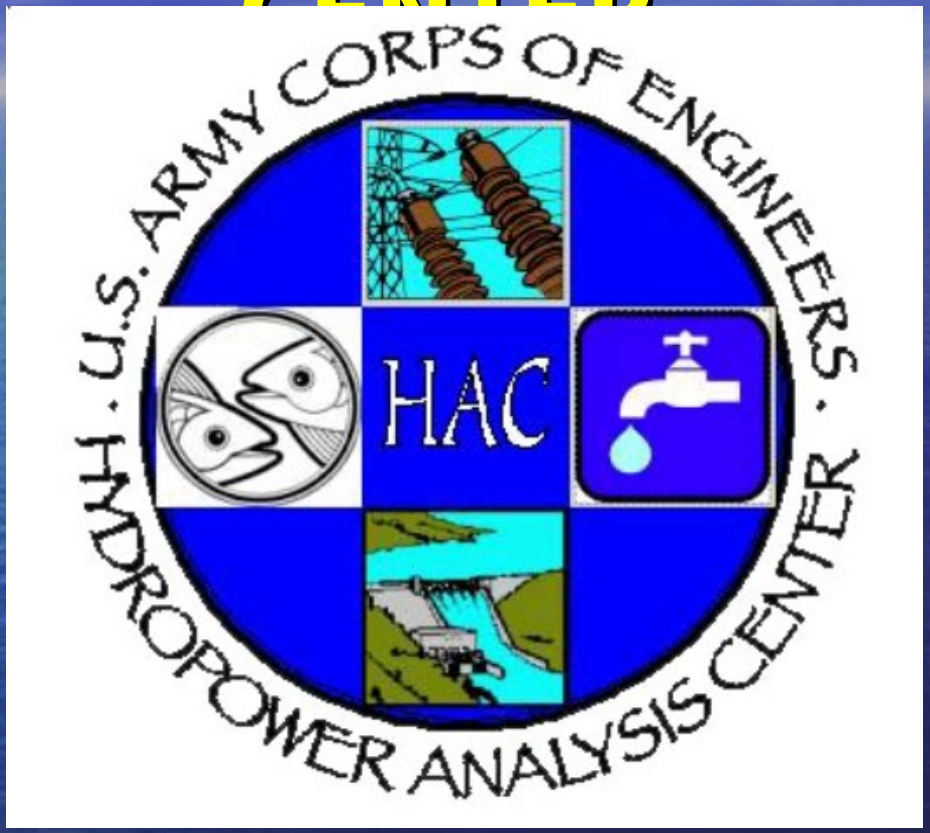
  &

- Hydroelectric Design Center (HDC):

  engineering and design

  (originally established in 1948)

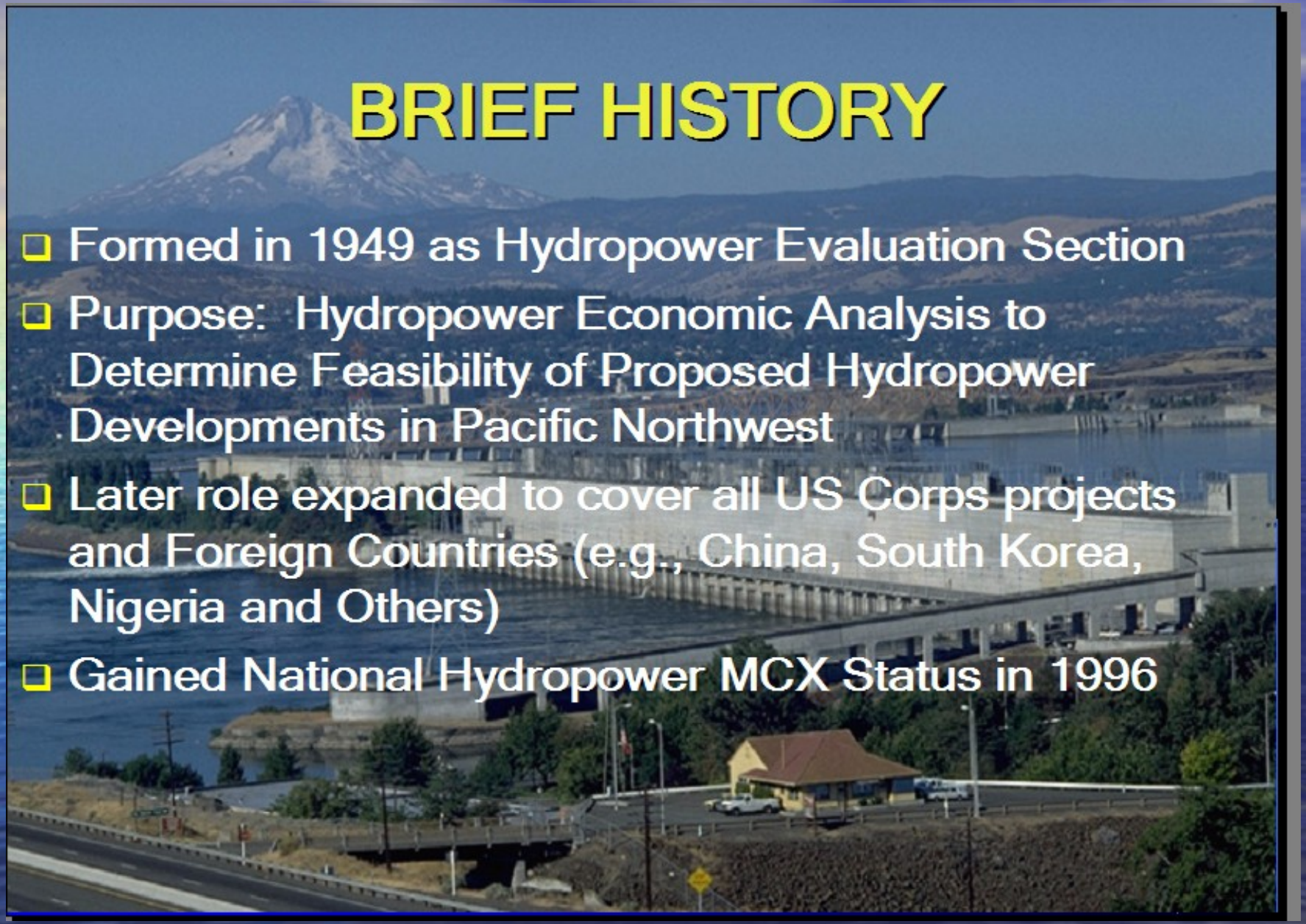
HYDROPOWER ANALYSIS CENTER



http://www.nwd-wc.usace.army.mil/PB/welcome.html

BRIEF HISTORY

- Formed in 1949 as Hydropower Evaluation Section
- Purpose: Hydropower Economic Analysis to Determine Feasibility of Proposed Hydropower Developments in Pacific Northwest
- Later role expanded to cover all US Corps projects and Foreign Countries (e.g., China, South Korea, Nigeria and Others)
- Gained National Hydropower MCX Status in 1996



HAC Roles & Capabilities

The HAC has over 40 years of experience in :

- Powerplant sizing, upgrades, and rehabilitation
- River system analysis
- Cost allocation and reallocation
- Power value and benefit computations
- Environmental and other powerplant studies

- Staff is cross-trained & familiar with stakeholders in all regions
- Works closely with 16 districts, PMA's, HQUSACE
- Helps the COE meet its hydropower functions efficiently
- Maintains in-house hydropower expertise to ensure that Corps can continue to efficiently carry out its hydropower mission
- Support US assistance to Third World countries (e.g., Chin Korea, Nigeria, Mozambique, etc.).

US Army Corps of Engineers

U.S. ARMY CORPS OF ENGINEERS · HYDROPOWER ANALYSIS CENTER · HAC

MAIN EXPERTISE AREAS
1. Hydropower Planning
2. Energy Studies
3. Capacity Studies
4. Economic Analysis
5. Power Impact Studies
6. Turbine Performance Selection
7. FERC Licensing
8. Regional Planning Issues
9. Hydropower Manual
10. Treaty PEBCOM
11. Procedures Development
12. Hydropower Planning Training

Hydroelectric Design Center

United States Army
Corps of Engineers
-Portland District

http://www.nwp.usace.army.mil/hdc/

HDC Mission

- Nationwide center of expertise for USACE hydropower.
- Design Center with a concentration of mechanical & electrical engineers.
- Provide technical support to the project & district offices.

What HDC does

- Planning Support
  - Recon and feasibility studies
  - Rehab and uprate studies
- Engineering Support
  - Equipment design and specification
  - Support Equipment
  - Testing
- Construction/Operation Support
  - Support during installation, acceptance
- Research and Development
  - Design support to labs.

Portland, Oregon
with Mt. Hood in the back
Thank You...